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BEFORE THE
POSTAL REGULATORY COMMISSION
WASHINGTON, D.C. 20268–0001

PRIORITIES FOR FUTURE DATA COLLECTION AND ANALYTICAL WORK RELATING TO PERIODIC REPORTING	Docket No. RM2011-3

POSTAL SERVICE REPORT REGARDING
COST STUDIES: RESPONSE TO PRC ORDER NO. 1626
(April 18, 2012)

This docket, commenced with issuance of PRC Order No. 589 (November 10, 2010), embodies a collaborative approach to defining and prioritizing potential improvements to the accuracy of cost, volume and revenue estimates used in its periodic reporting by the Postal Service.[1] Most recently in PRC Order No. 1626 (January 18, 2013), the Commission expressed its understanding of consensus perspectives realized during the course of this docket together with its views regarding respective priorities; it concluded by directing the Postal Service to provide, by April 18, a report on four areas of concern: 1) City Delivery Carrier Street Time, 2) Purchased Highway Transportation, 3) Postmaster Costs, and 4) Window Service Time. That report is attached hereto.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

Daniel J. Foucheaux, Jr.
Chief Counsel, Pricing & Product Support

Nabeel R. Cheema
Kenneth N. Hollies

475 L'Enfant Plaza, S.W.
Washington, D.C. 20260-1137
(202) 268-3083; Fax -5402

[1] PRC Order No. 1626 at 1.

BEFORE THE
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WASHINGTON DC 20268-0001

Priorities for Future Data Collection and Analytical Work Relating to Periodic Reporting	Docket No. RM2011-3

Report of the United States Postal Service in
Response to Commission Order No.1626
April 18, 2013

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I. INTRODUCTION

In Order No. 1626, the Postal Regulatory Commission identified its priorities for research into updating the attribution of costs to products. Specifically it identified four near-term research priorities:[1]

> Based on the inquiries already undertaken in this docket, the Commission concludes that remodeling the volume variability of city delivery street time, recalculating the elasticity of purchased transportation costs with respect to purchased transportation capacity, recalculating the volume variability of postmaster costs, and including new special services products in the calculation of volume variable window service costs should be made near-term research priorities.

In addition to identifying these areas of research, the Commission also specified what topics it would like to see investigated within each of these near-term areas. Finally, the Commission directed the Postal Service to submit a report by April 18, 2013 providing information on the status of its research in the following areas of cost attribution: city carrier street time costs, purchased highway transportation costs, postmaster costs, and window service time.[2]

This report provides the Postal Service's responses for each of the four identified areas. To facilitate an understanding of the Postal Service's responses, this document briefly reviews the research issues raised by the Commission. It then enumerates the reporting requirements imposed by Order No. 1626 and provides the Postal Service's responses.

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[1] See Order No. 1626, Docket No. RM2011-3, (January 18, 2013), *Order Setting Near-Term Priorities and Requesting Related Reports*, at 2-3.

[2] Id. at 12.

II. CITY CARRIER STREET TIME COSTS

This section of the report presents the research issues and reporting requirements related to city carrier street time costs. It also presents the Postal Service's responses.

A. Research Issues

Order No.1626 identified three consensus areas in which the Commission requested additional research. First, it requested further investigation of the usefulness of Delivery Operations Information System (DOIS) data for estimating econometric models of street time variability. Second, it sought investigation of the need for special studies of deviation parcel, accountable, and collection times and volumes to estimate street time percentages and econometric models of volume variability. Lastly, the Commission urged examination of how bundles should be considered as cost drivers in a volume variability model for regular delivery.

B. Reporting Requirements

Order 1626 identified specific items relating to city carrier street time costs that should be included in the Postal Service's report. It indicated that the Postal Service should:

1. Describe how it plans to determine the bundle variables used in the regular delivery regression;
2. Describe any further testing of the DOIS data;
3. Provide a conclusion about the utility of DOIS data for estimating variabilities;

4. Apprise the Commission of progress made in designing field studies of parcels, accountables and/or collection mail, including sample design and methods; and

5. Provide an overall description of its research concerning specification of a new econometric model.

The next section of this report contains the Postal Service's responses to these requirements.

C. Postal Service Response

The Postal Service's approach to updating the city carrier street time model is to use operational data, when accurate and available, supplemented by field studies, as necessary. This approach permits an update even in the face of severe budget constraints while further leveraging the operational data already collected by the Postal Service. The three main steps in attributing city carrier street time costs are formation of the cost pools, estimation of the variabilities for measuring attributable costs within each cost pool, and distribution of the attributable costs to products. As discussed in the Postal Service's Scoping Study,[3] the Postal Service has found Form 3999 data to be both sufficient and acceptably accurate for the purpose of cost attribution. Therefore, it will use those data to construct the time proportions needed for cost pool formation.

The Postal Service then plans to use a combination of Form 3999 data and DOIS data, along with necessary field studies, to update the variability estimation. Finally, the Postal Service plans to continue using data from the City Carrier Cost System (City

[3] See PRC Docket No. RM2011-3, *Scoping Study Report of the United States Postal Service*, (May 30, 2012), hereafter "Scoping Study" at 41.

CCS) to form the distribution keys. The following sections of this report describe the progress made by the Postal Service in the research areas articulated by the Commission.

1. Determining What Bundles to Use in Estimating the Regular Delivery Equation

The volumes delivered by city carriers are important drivers of street time costs. They should be included in any econometric equation designed to describe street time. In addition, volumes should be grouped to preserve homogenous cost-causing characteristics. For city carrier street time delivery, those cost-causing characteristics relate to: (1) the likelihood that a type of mail will create an additional stop and (2) the additional time created by that type of mail at a stop.

City carrier delivery, whether on walking or driving routes, is organized around the bundles (or containers) of mail a carrier uses in making delivery. Items within a given bundle will have the same cost-causing characteristics as they are handled the same way on the street. Thus, an appropriate way to specify the volume-related cost drivers for a regular delivery equation is to have those volume groupings reflect actual bundles (or containers) used by city carriers.

Consultation with delivery operations experts revealed that in the current operating environment, city carriers generally make use of four bundles. The first, and largest in terms of volume, is Delivery Point Sequence (DPS) mail. This bundle is defined by mail processing operations, as it contains letter mail that comes to the carrier already in walk sequence. Similarly, the Flats Sequencing System (FSS) produces a carrier bundle that is also defined by mail processing operations. Mail that avoids these mail processing operations is part of a residual bundle called cased mail. This bundle includes all mail that is cased, regardless of shape, and includes cased letters, cased flats and cased parcels (these last are also known as small parcels and rolls (SPRs)). Note that with the reduction in cased mail, all three shapes are cased together. Finally, on certain days, city carriers may receive a container of mail directly from a mailer that is already walk sequenced. This "sequenced" mail is normally taken directly to the street, making up the fourth bundle that city carriers may use.

On purely motorized routes, like curbline, city carriers will deliver mail using these four bundles: DPS mail, FSS mail, cased mail, and sequenced mail. However, on both foot and park and loop routes, city carriers are generally limited to only three bundles. This means that the carriers on these routes normally collate the FSS mail with the cased mail, so that they have only three bundles.

2. Further Testing of the DOIS Data

An important research question is whether the Postal Service can estimate an accurate delivery time model using ongoing operational data sets. City carrier street time is broken down into different components, or cost pools, one of which is delivery time. As a result, the city carrier street time cost model requires estimation of the relevant cost elasticities, or volume variabilities, for the delivery component.[4] In the past, the Postal Service has mounted large field studies that collected the relevant data for estimating delivery time cost elasticities. However, thanks to improved operational databases and encouraged by budget constraints, the Postal Service consistently

[4] "Cost elasticity" and "volume variability" are synonymous terms for the percentage change in cost caused by a percentage change in volume (or other relevant cost driver).

investigates whether ongoing operational data sets can be used to update the estimation of cost elasticities, without the need for an expensive, full-blown field study.

The best candidate operational database for estimating a street time delivery equation is DOIS. Part of DOIS entails the daily recording of street times, office times, and delivered volumes for virtually all city carrier letter routes in the country. Office and street hours for each route are recorded daily, and are taken from the Postal Service's Time and Attendance Control System (TACS). DOIS also measures delivery volumes. Automated mail volume piece counts are taken from End of Run (EOR) reports, while cased letter and flat volumes are recorded linearly and then converted to pieces. Finally, sequenced mailings, including both letters and flats that do not require casing, are recorded as sets (either full or partial) and then converted to pieces based upon the number of residential deliveries on the route.

In 2012, the Postal Service provided extensive empirical evidence demonstrating the utility of the DOIS volume data for estimating such a delivery time equation.[5] The Postal Service concluded that:[6]

> The DOIS daily data cover nearly all of the routes and ZIP Codes in the country and provide volume and time data for every delivery day in the year. The data set is extensive, timely, and acceptably complete. A comparison of DOIS daily data with CCCS data shows that the DOIS daily data are reasonably accurate and consistent. The DOIS daily data would appear to hold the potential for estimating street time variabilities.

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[5] See Scoping Study at 17.

[6] Id. at 27

Thus the key remaining question in evaluating the DOIS database for estimating a regular delivery equation is the utility of DOIS hours for estimating a delivery time equation.

There is no doubt that DOIS provides sufficient data for estimating a delivery equation, as it records the street hours for all city carrier routes in the country on a daily basis. However, DOIS does not provide a measure of just delivery time. Rather it measures total street time, which includes both delivery time and non-delivery time.[7] Thus, to estimate a delivery time equation, the DOIS daily street time hours must be adjusted to remove non-delivery time. Fortunately, the Postal Service has another operational database that can be used for that purpose, the Form 3999 database.[8] The Form 3999 data set contains detailed information on each city carrier route in the country. The data are collected when the route is evaluated. A route evaluation is the process through which the Postal Service collects detailed data on how much time a carrier spends in the various office and street activities on a route. Thanks to extensive evaluation of city routes throughout the nation due to changes in both mail volume and automation, a timely Form 3999 dataset is available.

The definitions of street activities in the Form 3999 database reflect the actual operational structure on the street. The first operational distinction is between "sector segment time" and "allied time." Sector segment time in the Form 3999 database is the same thing as delivery time in the city carrier street time model. It covers the actions

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[7] Delivery time is made up of the time required for actions by city carriers in the normal course of delivery within route sections. Non-delivery time is made up of time for other actions that take place on the street, like visiting a relay box or driving in between route sections, which are not directly involved in the act of delivery.

[8] For a description of this database, see Scoping Study at 8.

associated with making delivery at individual delivery points and is closely related to the volume of mail delivered. Allied time covers the other activities that take place on the street, which are not directly determined by the volumes of mail delivered. The activities recorded in Form 3999 allied time include:

Relay Time	Travel Within Time
Travel To Time	Accountable Time
Travel From Time	Parcel Time
Vehicle Load Time	Break Time
Vehicle Unload Time	Collection from SLB Time
Non Recurring Time	

None of these activities is directly associated with the letters and flats delivered on an individual route in the city carrier network. For example, travel within time (sometimes called network travel time) is fixed with respect to volume. Time for collection from street letter boxes forms a cost pool separate from the delivery time cost pool and is associated with volumes in collection boxes, not volumes delivered. Similarly, parcel and accountable delivery time is a separate cost pool and reflects the volumes of parcel and accountables delivered -- not letter and flat volume delivered. Vehicle loading and unloading is considered office time in the city carrier street time cost model.

In sum, delivery time on the street is equal to the total street time minus allied time as defined by Form 3999. This means that the Postal Service can calculate delivery time for each route, for each day, by taking each route's DOIS street time and subtracting its (constant) Form 3999 allied time. This subtraction produces a time variable that relates directly to the volumes contained in the carrier bundles.

To investigate this measure of delivery time, the Postal Service pulled a sample of approximately 1,000 ZIP Codes and extracted the DOIS daily data for each city carrier route in each ZIP Code for a month. It then calculated the daily delivery time for each route by taking its recorded DOIS street time and subtracting its (constant) Form 3999 allied time. The following table presents the distribution of daily delivery times, in hours, for the over 329,000 route days in the sample dataset.

Statistics for DOIS Delivery Time (Hours)

Mean	5.11
Median	5.23
Standard Dev.	1.19
95% Lower Bound	2.79
95% Upper Bound	7.43

This distribution suggests that 95 percent of the route days have a DOIS delivery time between 2.8 hours and 7.4 hours, a result that comports well with delivery operations experience. A very small number of route days (0.003 percent) reported negative delivery time. Investigation of those route days revealed that this result occurs because the recorded DOIS hours for that route day were either zero or very close to zero. Subtracting a positive amount of allied time from zero street time produces the negative delivery time.

Further investigation of these route days indicated that this unusual result occurs because of pivoting -- a situation in which the carrier does not deliver (all) the mail on his or her regular route with the deliveries instead made by other carriers within the same ZIP Code. Typically, a missing carrier's route is split among two or more other carriers. If those carriers do not re-clock their hours to the missing carrier's route number, then little or no street time will be recorded for that route despite the fact the mail is delivered. Additional investigation revealed two empirical results that support the existence of pivoting. First, routes with zero DOIS street time often also have zero DOIS office time, indicating the carrier was absent. Second, examination of street time for the other routes in the ZIP Code, besides the pivoted route, shows that those other routes have statically significantly higher street time on the days during which a pivoted route has zero or little street time.

The major implication of this issue is that while pivoting can lead to a possible misreporting of street hours at the individual route level, it is not a problem for analysis conducted at the ZIP Code level. The street hours for a ZIP Code are just the sum of the hours for the individual city routes within the ZIP Code, so any under-clocking of hours to an individual route is exactly offset but over-clocking of hours to other routes. Consequently, the total volume delivered and the total time required for delivering that volume still match. Because the delivery equation is estimated at the ZIP Code level, pivoting raises no problem for its estimation.

A last check on the usefulness of the augmented DOIS daily volume for variability estimation is to use it in estimating a test equation. The route day delivery times were aggregated to the ZIP Code day level for estimation and then regressed against the ZIP Code day volumes and delivery points. The econometric model is given by the following equation:

$$Delivery\ Time_{it} = \beta_0 + \beta_1 V_{it} + \beta_2 V_{it}^2 + \beta_3\ PD_{it} + \beta_4\ PD_{it}^2 + \beta_5 ([V]_{it} * PD_{it})$$

$$+ \beta_6\ MPD_i + \beta_7\ MPD_i^2 + \beta_8\ DT_i + \beta_8\ DT_i^2 + \varepsilon_{it}$$

In this equation, V stands for the sum of volumes of mail in the DPS, cased mail, FSS and sequenced bundles, PD stands for possible delivery points, MPD represents miles per delivery point and DT represents the "delivery type," captured by the percentage of walking routes within a ZIP Code. The complete regression results are presented in the Appendix to this report, but a highlight of key results is presented below:

Results of Estimating a Delivery Time Regression using DOIS Data

Volume Variability	30.2%
Marginal Time per Piece (Seconds)	2.7
Marginal Time per Delivery Point (Seconds)	22
R^2	0.918
# of Observation	25,132

Estimation of this equation provides results are that are sensible and consistent with previous research on estimating city carrier costs. From this evidence, the Postal Service concludes that DOIS can and does provide the delivery time data needed for estimating a regular delivery time equation.

3. Evaluating the Usefulness of the DOIS Data

DOIS has come a long way since it was first introduced. It is now used regularly by delivery supervisors to manage city carrier delivery and it is used to evaluate delivery performance. Such wide use is commensurate with emphasis the Postal Service has put on its accuracy.

Several important characteristics of DOIS data make it useful for variability estimation. First, it is extensive. It provides measures for street time and volumes delivered on all city routes in virtually all ZIP Codes, on a daily basis. In addition, DOIS includes most of the variables of interest. Lastly, because DOIS is an ongoing data system, city carrier information is available in a timely manner.

The Postal Service has carefully evaluated the accuracy of DOIS daily data set both by examining its own properties and by comparing it to other data systems that measure the same or similar variables. That evaluation has shown that both DOIS times and DOIS volumes match well against other data sources. Experiments with using DOIS data to estimate equations similar to the regular delivery equation have demonstrated that it can produce reasonable and accurate parameter estimates. As a result of this extensive evaluation, the Postal Service concludes that the DOIS daily data are acceptably accurate for variability estimation

4. Progress in Designing Field Studies

While DOIS data exhibit great potential for updating the regular delivery equation, there is one possibly significant drawback associated with its use. DOIS does not record the amount of mail that city carriers collect directly from customers. This means that estimated coefficients from a regular delivery time equation based solely on DOIS data are potentially biased because of the omission of a variable for mail collected from customers. The collection of mail from customers' receptacles is tightly integrated with the delivery activity. Recorded delivery times include both the time associated with delivering mail to customers and the time associated with collecting mail from customers. This means that a potentially important variable for explaining variations in delivery time is the volume of mail collected directly from customers.

However, as mentioned above, the DOIS database does not include a measure of this collected volume. To have a complete set of volume variables, the DOIS database needs to be augmented by a field study designed to measure and record volumes collected directly from customers. To satisfy this potential deficiency in the DOIS database, the Postal Service has initiated such a study. It is called the city carrier Collection Mail Volume and Source Study (CMVS).

The CMVS will ask city carriers to record collection volumes, by source and shape, for twelve consecutive delivery days. The possible sources of volume are: (1) mail collected directly from customer receptacles, (2) mail taken from collection points (*e.g.*, blue boxes or mail chutes) and (3) containerized mail received from businesses. Collection mail volume for letters and flats will be recorded in linear measurements, using quarter inch increments, and piece counts will be used for parcels.

The CMVS utilizes a stratified systematic sample of three-hundred ZIP Codes from a frame of 10,720 ZIP Codes that contain city carrier routes. Two variables which are highly correlated with a ZIP Code's street time are the number of routes in the ZIP Code and the ZIP Code's delivery mode. These two variables are used to stratify the data into six subdivisions. First, ZIP Codes are classified as being small, medium, or large based on their counts of city letter routes. The size boundaries and frequencies for each category are shown in the following table.

Size of ZIP Code	Number of city letter routes	Quantity
Small	Fewer than six	3,296
Medium	More than five and fewer than twenty-one	5,041
Large	More than twenty	2,383
Total		10,720

The second stratification variable is the predominant delivery method used in the ZIP Code, either "driving" or "walking." Each route in the ZIP Code is so classified based on its route type. The following table indicates the classification associated with each route type.

Route Type	Classification
Curbline	Driving
Dismount	Driving
Foot	Walking
Park & Loop	Walking
Other	Walking

Each ZIP Code is then categorized as being "driving" or "walking" based on the plurality of routes within the ZIP Code. If the number of "driving" and "walking" routes is equal, the ZIP Code is deemed to be 'walking'. The following table illustrates the distribution, by this delivery classification, of ZIP Codes in the frame.

ZIPs	Quantity	Proportion
Driving	4,345	40.53%
Walking	6,375	59.47%
Total	10,720	100.00%

Combining the two stratification variables produces six strata, as listed in the following table:

Strata Used in CMVS to Divide The Frame of City Letter Routes

Stratum	Definition	Number of ZIPs	Proportion of Street Time
Low # of Routes, Driving	Driving ZIP fewer than six routes	1,209	2%
Low # of Routes, Walking	Walking ZIP fewer than six routes	2,087	4%
Medium # of Routes, Driving	Driving ZIP with more than five and fewer than twenty-one letter routes	2,254	20%
Medium # of Routes, Walking	Walking ZIP with more than five and fewer than twenty-one letter routes	2,787	24%
High# of Routes, Driving	Driving ZIP with more than twenty letter routes	882	18%
High # of Routes, Walking	Walking ZIP with more than twenty letter routes	1,501	32%

The sample size of three-hundred ZIP Codes was the maximum possible consistent with current budgetary constraints. However, it is useful to recall that the 2002 and 2004 city carrier street studies included far fewer ZIP Codes. Even with diminished budgetary restraint, those smaller sample sizes were necessitated by sampling efforts that required collecting both volume and *time* information from the carriers. Recording time information regarding carrier street activities is extremely expensive relative to measuring volumes. The 2002 effort sampled approximately one hundred and sixty ZIP Codes while the 2004 investigation sampled roughly one hundred and twenty ZIP Codes. Due to the availability of operational data that provide carrier street activity times, the current study samples between one-and-a-half to two-and-a-half times as many ZIP Codes than the previous surveys, at a far lower cost. The increased sample size should result in an improvement in the precision of the estimates in the regular delivery equation.

The three-hundred selected ZIP Codes were assigned to strata using proportional allocation based on each stratum's share of street time. For example, the stratum 'medium driving' was assigned a sample of sixty because its share of city street time is twenty percent (300 x 20% = 60). Within each stratum, the N_h ZIP Codes are placed in ascending order and a random number, p, between 1 and $k = \frac{N_h}{n_h}$ is chosen. The stratum's sample consists of the p^{th} unit and every k^{th} unit thereafter. Since ZIP Codes are determined by location, this systematic selection method ensures geographic dispersion across all strata. The following table shows the number of sampled ZIP Codes by Postal Area.

Number of Selected ZIP Codes by Postal Area

Area	Sampled ZIP Codes
Capital Metro	25
Eastern	48
Great Lakes	38
Northeast	47
Pacific	43
Southern	54
Western	45
Total	300

The Postal Service recently concluded a CMVS beta test, thereby providing it an opportunity to refine the data collection procedures and to evaluate the study's ability to measure collection volumes accurately. Review of the data collected in the beta test indicated that they were complete and accurate so the Postal Service is launching the full study this spring.

One other area where the city carrier street time cost model could use an update is the parcel/accountable cost pool variability. The delivery of parcels and accountables that cannot be delivered in the normal course of delivery is an activity separate from regular delivery and the time associated with their delivery forms its own cost pool. As a result, the parcel/accountable variability is estimated with its own econometric equation; the Postal Service investigated the use of its operational data to update that equation. Several deficiencies were found. DOIS does not include a measure of accountable volumes. It does include a measure of parcel volumes but without distinguishing between those parcels that fit into the mail receptacle (and are thus delivered in the regular course of delivery) from those that do not (and thus require a deviation and/or customer contact).

Because of these deficiencies, the Postal Service has concluded that a field study will be necessary to update parcel and accountable variabilities. Initial planning for such a study has commenced.

5. An Overall Description of The Postal Service's Research Concerning Specifying a New Regular Delivery Econometric Model

The Postal Service's progress toward collecting the required data, specifying a model to be estimated and choosing the appropriate econometric techniques for estimating a new regular delivery equation is based upon a multi-step approach. This section describes its research methods concerning specification and estimation of a new regular delivery model. That research includes the following steps:

Step 1: Undertake a field study to measure the volume of mail collected from customers in 300 ZIP Codes for each day over a two-week period.

Step 2: Combine the collection volume data with DOIS data for DPS mail, cased mail, FSS mail and sequenced mail for the same 300 ZIP Codes over the same two weeks.

Step 3: Calculate the delivery time for each ZIP Code day using DOIS street times and Form 3999 allied times.

Step 4: Specify and construct the relevant characteristic variables like miles per delivery point and delivery mode of the ZIP Code.

Step 5: Specify the form of the equation to be estimated, taking into account the roles of FSS mail and sequenced mail. This specification includes the appropriate bundles and characteristic variables, and reflects the fact that the Postal Service manages delivery at the ZIP Code level.

Step 6: Choose the appropriate econometric techniques given the characteristics of the data and the model to be estimated.

Step 7: Use the constructed data set to estimate the regular delivery equation at the ZIP Code level and calculate the relevant variabilities.

III. Purchased Highway Transportation Costs

This section of the report presents the research issues raised and reporting requirements specified in Order No.1626, as they relate to purchased highway transportation costs. It also contains the Postal Service response addressing those reporting requirements.

A. Research Issues

In the area of purchased highway transportation, the Commission identified three areas of research interest. First, the Commission expressed interest in having the Postal Service re-estimate the elasticities of cost with respect to capacity for the various highway accounts. The Commission identified this as a near-term research priority. Second, the Commission indicated it would be useful to have the Postal Service review and possibly revise, if appropriate, the specification of the econometric model used to estimate the cost-to-capacity variabilities. This was identified as a medium-term research priority. Finally, the Commission would like the Postal Service to investigate whether the relationship between capacity and volume should continue to be proportional, by assumption, or whether it should be measured.

B. Reporting Requirements

The Commission specified that the Postal Service should include the following items in its report. First, the Postal Service is to provide a plan for recalculating the elasticity of cost with respect to capacity, including a description of the planned data sources, resources required, and a time line. Second, the Postal Service is to address the implications of Mail Processing Network Rationalization (MPNR) on the estimation of the cost-to-capacity elasticities and to discuss how it thinks a fully implemented MPNR would affect their estimation.

Third, after updating the cost-to-capacity elasticities, the Postal Service is to provide a subsequent report on the potential costs and benefits of modifying the current regression model, and on the feasibility of modeling the elasticity of capacity with respect to volume, including a consideration of possible application of TIMES, Surface Visibility, and IMB data.

C. Postal Service Response

The Postal Service investigated the availability and usefulness of existing operational databases for both updating the existing cost-to-capacity variability and for investigating the assumption of proportionality between capacity and volume. The next sections of this report present what the Postal Service has found and discuss its research agenda for updating purchased highway transportation attributable costs.

1. Updating the Elasticity of Cost with Respect to Capacity

The Postal Service last updated the estimated elasticities of purchased highway transportation costs with respect to capacity in Docket No. R2000-1. At that time, the required equations were estimated with data from the Highway Contract Support System. That data system no longer exists, but the necessary data are available from anther data system, the Transportation Contract Support System (TCSS). The Postal Service uses the TCSS to manage its purchased highway transportation contracts. As a result, TCSS contains data on annual costs, truck capacities, frequencies, and miles for all contract cost segments. These are exactly the variables required for updating the approved highway transportation equations.

The primary resources required for updating the equations are knowledge of existing models, an extract of the data from the TCSS, expertise in econometrics, and the time to pursue the estimation updates. The Postal Service anticipates starting the research required for updating the various cost elasticities in May 2013 and expects to complete the update by the end of the calendar year.

2. Addressing the Impact of MPNR on Estimation of Elasticities

The primary impact of mail processing network realignment (MPNR) on the highway transportation network is to reduce the size of the necessary transportation network. Although fewer transportation links will be required, it is not anticipated that this network change will affect the relationship between cost and capacity for the surviving contract cost segments. Moreover, the impact of MPNR on purchased transportation costs is expected to be quite small. The Commission estimated that the gross cost savings in purchased highway transportation arising from the MPNR to be just $88.4 million and the Postal Service estimated these savings to be $123.2 million.[9] In Fiscal Year 2011, the cost of purchased highway transportation was $3.3 billion. This means that network realignment is expected to reduce purchased highway transportation cost by about 3 or 4 percent.

Given that the Postal Service expected highway transportation cost reductions driven by MPNR could best be recognized only as respective plant consolidations are

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[9] See Postal Regulatory Commission *Advisory Opinion On Mail Processing Network Rationalization Service Changes*, Docket No. N2012-1 at 111 (September 28, 2012).

undertaken, and given the modest size of the estimated savings, the only practical and best way for the Postal Service to investigate and account for changes in the transportation network caused by the MPNR is to periodically update the cost-to-capacity variabilities.

3. Investigating the Feasibility of Modeling the Elasticity of Capacity with Respect to Volume

Currently the transportation cost model operates on the assumption that capacity varies in proportion to volume. However, this assumption has never been supported nor contradicted by empirical evidence. To see if data exist that could be used as relevant empirical evidence, the Postal Service has investigated the use of TIMES data and Surface Visibility (SV) data to estimate the elasticity of capacity with respect to volume.

Using these data, the Postal Service investigated the patterns and behavior of utilization in the purchased highway transportation network. This is relevant because if capacity is proportional to volume then capacity utilization should not increase or decrease as volume changes. The investigation involved construction of an analysis data set from the raw TIMES/SV data and matching it with routing information from NASS. The resulting analysis database captured the regular transportation links recorded in TIMES/SV which were also scheduled on the transportation frame. This set of regular transportation route-trip-legs was analyzed for patterns in utilization. The analysis provided insight into the way the network is used and supported subsequent analysis of the relationships among volume, utilization, and capacity.

Most of the purchased highway transportation network is constructed using round trips from an origin facility to a destination facility and back, with possible intermediate stops along the way. However, the TIMES/SV data are recorded at the route-trip-leg level with many local variations in the use of route, trip, and leg, assignments. This means that there is no straightforward way to construct a route-trip database from existing raw data. Consequently, the Postal Service developed a linking structure that permitted construction of unique route trips from the recorded TIMES/SV data.

The Postal Service tested the linking structure and produced a sample analysis dataset. It then analyzed that dataset for feasibility in estimating an econometric equation that could be used to estimate a capacity-to-volume elasticity.

Although the econometric results produced preliminary evidence suggesting that capacity is not perfectly proportional to volume, the analysis also raised significant questions about the reliability of the TIMES/SV data. For example, the process of building the data set required a relatively high amount of "data cleaning." In addition, a number of key data issue questions arose, like a difficulty in matching reported routings with building locations, the accuracy of the reported utilizations, missing observations for key variables like "leave date" and some apparent irregularities in the operations of some routes. As a result of this analysis, the Postal Service concludes that the TIMES/SV data are not sufficiently accurate and complete to meet Commission standards at this time.

However, given the potential importance of this issue, the Postal Service is planning to investigate an alternative approach. It will first investigate an approach first suggested by the Commission that makes use of quarterly TRACS data by day of the week.[10] The Postal Service plans to begin this investigation once the cost-to-capacity variabilities are updated.

IV. Postmaster Costs

This section of the report presents the research issues raised and reporting requirements specified in Order No.1626 as they relate to postmaster costs. It also contains the Postal Service response addressing those reporting requirements.

A. Research Issues

The Commission notes that the currently estimated volume variability for postmaster costs was presented in Docket No. R84-1, based upon a model estimated using data collected in FY 1978 and FY 1979. With that background, the Commission identifies the following set of research issues. First, the Commission suggested that the Postal Service should recalculate the variability of postmaster salaries with respect to Workload Service Credits (WSCs). It identifies this area as a near-term research priority. In addition, the Commission indicated the Postal Service should consider appropriate possible refinements to the equation used to estimate the variability of postmaster salaries. It identified this area as a medium-term research priority. Lastly, the Commission indicated it was interested in investigating the assumption that Work Service Credits vary in proportion to volume. This was identified as a long-term research priority.

[10] See Postal Regulatory Commission *Advisory Opinion On Elimination of Saturday Delivery*, Docket No. N2010-1 (March 24, 2011) at 98.

B. Reporting Requirements

The Commission articulated two specific reporting requirements in the area of postmaster costs. First, the Commission indicated that the Postal Service should submit a plan for recalculating the elasticity of postmaster labor costs with respect to WSCs, including a description of the plan, the data sources used, the resources required, and a time line for implementation. Next, the Commission stated that the Postal Service should consider the impact of POStPlan on the elasticity calculation, including the fact that it may need to update the variability after September 2014, particularly if the method of paying postmasters changes.

C. Postal Service Response

The Postal Service has made an initial review of the existing econometric model that provides the basis for calculating the current postmaster variabilities. It also has reviewed the data used to estimate the equation. It used this initial review to construct a plan for updating the postmaster variability. The Postal Service has also reviewed POStPlan for the purpose of investigating its possible effect on the attribution of postmaster costs. The Postal Service's study plan for updating the postmaster variability and its consideration of the impact of POStPlan on attributable postmaster costs are presented in the next two sections.

1. Updating the Postmaster Variability

Based upon its initial review of the model and data used to estimate the current postmaster variability, the Postal Service is proposing the following four-step plan to update that variability:

Step 1: <u>Review and Analyze the Existing Study</u>
The first step forms the basis for all subsequent work. A thorough review and analysis of the existing study is required to lay the foundation for both the work needed in performing the update and interpreting the results of that work. It also provides the basis for considering other possible data sources or different approaches to estimating the variability

Step 2: <u>Investigate the Availability of More Recent Data</u>
A key requirement of an update is the availability of the more recent data of the same, or similarly useful, nature used to estimate the existing variability. The variability for postmaster costs is currently based upon an estimate of the relationship between postmaster salaries and postmaster Workload Service Credits (WSC). Therefore, the sources of data for both postmaster salaries (EAS pay levels) and the WSC system need to be investigated. Preliminary review suggests that it appears as if the necessary data for an update exist.

Step 3: <u>Replicate the Existing Model Using New Data</u>
Once the Postal Service as updated the data used to estimate the original model, it can use that data for re-estimation of the existing model specification.

Step 4: <u>Consider Refinements of the Computational Techniques</u>
There have been advances in econometric techniques since the postmaster variability equation was estimated. It is reasonable to investigate whether a more refined econometric technique would improve the estimation.

The primary resources required for an update to the postmaster variability are a thorough knowledge of the existing model and econometric techniques, an investigation of an update of the data that were used to estimate the model, and time to pursue the estimation updates. The Postal Service anticipates initiating the update in FY2014 and will determine the usefulness of pursuing that update based upon the expected changes flowing out of POStPlan.

2. Considering the Impact of POStPlan on the Elasticity Calculation

The Postal Service's review of POStPlan from the perspective of cost attribution indicates that the main effect is likely to arise from the fact that a different compensation system will take effect for postmasters who work in Post Offices that will be categorized below an EAS level 18.

Any such post offices will get reconfigured as a 2 hour, 4 hour, or 6 hour office, determined by the hours of service provided. A 6 hour office will be staffed by a career employee, but at a standard pay rate. The 2 and 4 hour offices will be staffed by non-career employees at a different standard rate. On the other hand, some current part time offices will be elevated to an EAS-18 level.

The Postal Service concurs with the Commission that this change raises the possibility that the postmaster elasticity may need to be revised or estimated in a different way. The Postal Service will need to carefully investigate the implications of this POStPlan change for estimating the variability of postmasters. This review will also help determine if an update of the existing model is an appropriate way to improve the attribution of postmaster costs.

V. Window Service Time Costs

This section of the report presents the research issues raised and reporting requirements specified in Order No.1626 as they relate to window service time costs. It also contains the Postal Service response addressing those reporting requirements.

A. Research Issues

The Commission identified one research interest in the area of window service time. Specifically, the Commission is interested in having the Postal Service investigate methods for identifying the costs of certain small products that are consistent with the established IOCS-based methods used for larger volume products.[11] It identified this as a near-term research priority.

B. Reporting Requirements

The Commission indicated that the Postal Service should describe the candidate methods that it is considering for estimating the attributable costs of small-volume retail services newly designated as individual products, such as Mailing and Shipping Supplies, and Greeting Cards.

C. Postal Service Response

The current IOCS approach identifies the costs attributed to products by determining the number of product-specific tallies associated with each product. The product-specific tallies occur when a clerk is handling the mail piece or retail product and may occur during a single item-transaction or a multiple-item transaction. If a product causes 30 percent of window service time, then, theoretically, the IOCS approach will identify that product being handled 30 percent of the clerk's time. Note that the IOCS sampling process captures each product's attributable time whether that time comes from single item transactions or multiple item transactions.

[11] Examples of these products are Mailing and Shipping Supplies, and Greeting Cards.

The IOCS approach works well for products that cause a material amount of the clerk's total window time, but it struggles to accurately measure the time associated with products that generate only a small percentage of the total time. This means small-volume retail products, such as Mailing and Shipping Supplies, and Greeting Cards, raise a costing challenge for the IOCS system. The extremely small number of IOCS tallies and the possible volatility of those numbers from year to year preclude their use as reliable estimators of the tiny amount of cost associated with these small products. Consequently, the Postal Service has begun investigation of alternative methods for determining the attributable cost for these small products that are consistent with the established IOCS methods.

First, the Postal Service investigated constructing "bottom up" costs for these small products. In this approach, the Postal Service would observe and time transactions involving the small products in order to estimate a standard or average transaction time. If such costs could be calculated, the Postal Service would then contemplate how to integrate them into the window service cost model.

To collect the necessary data, the Postal Service identified those offices known to have the highest volumes of small products. It then visited those high-volume offices during time windows when the activity in these small products was expected to be the heaviest. It did so with the intent of observing transactions for these small products in order to build bottom-up costs. Unfortunately, these products are so infrequent that even at the highest-volume offices, during the anticipated highest-volume time frames, the number of observed transactions were are too few to be useful.

The Postal Service also investigated its ongoing operational databases to see if any of them could support an alternative method of calculating attributable costs for small retail products. A natural place to start this process is with the Postal Service's Point of Sale system, entitled POS ONE. This system provides nearly a census all retail transactions that result in a product sale, including a record of what items were sold, how many of each item was sold, and a measure of the time associated with the transaction. On the surface, this seems like exactly the information required for attributing window service time to products. However, investigation into the database revealed two critical deficiencies associated with using POS ONE data to estimate window service product costs.

First, the recorded POS ONE times do not include the entire time of the transaction. The transaction time recorded in POS ONE is just the time from when the clerk presses the button to enter the first item to be sold until when the receipt is printed. This amount of time is less than the total transaction time, which would include the greeting, customer questions and/or request and clerk response, and any post-receipt clarifying conversation, in addition to the actual transaction involving the receipt of payment and transfer of product. It is likely that the difference between the true transaction time and the POS ONE transaction time will vary with the type of transactions. For example, consider a transaction with a single coil of stamps being sold. The customer probably does not have many questions about the item and there are but a few alternatives to consider. This means that there will be only a limited amount of time before the first POS terminal key is pushed. In this transaction, the total transaction time is likely to be quite close to POS ONE transaction time.

A transaction including an Express Mail piece with extra insurance could be a bit more complex. The customer may wish to know about delivery times or the value of Express Mail compared to a Priority mail alternative, may have questions about standard versus extra cost insurance, about the guarantee, and may need some help in preparing the Express Mail envelope. Here the actual transaction time is likely to be much larger than the time recorded in POS ONE.

A second problem with POS ONE data is that although it records the total transaction time for a multiple item transaction, it provides no way of accurately dividing the multiple transaction time among the items being sold in the visit. Thus, even if the recorded transaction times were acceptable, it does not resolve how to attribute multiple item transaction times to respective products.

Because of these limitations, the Postal Service pursued a more limited approach to using POS ONE data. Rather than attempting to use POS ONE data to directly measure the attributable time for small-volume retail, the Postal Service investigated using it to distribute <u>relative</u> amounts of attributable transaction time. Specifically, it investigated using POS ONE data to distribute the IOCS costs for a group of small retail products, based upon the idea that IOCS would be able to produce a sufficient number of tallies to produce a stable cost pool for the product group. This approach would then use the relative recorded POS ONE times for each item in the group to form the required distribution key.

The main difficulty in implementing this approach arises from multiple-item transactions. Unlike single-item transactions which are directly attributable to one product, the Postal Service recognized that a reasonable mechanism must be constructed for distributing the time incurred in multiple item transactions. With this caveat in place, the Postal Service investigated a possible three-step method:

Step 1: Construct a group of retail products sufficiently large to ensure an accurate and stable IOCS cost pool.

Step 2**:** Use POS ONE transaction data to construct the relative proportions of window service transaction time for the included retail products.

Step 3: Apply the relative POS ONE time proportions to the IOCS cost pool to identify and attribute costs to retail products. This step requires figuring out how to estimate and assign the non-POS times of the transactions -- or acknowledge that those times are in the IOCS times and assign them proportionally to the POS ONE times

To illustrate this method consider the following example. Suppose that there is a multiple item transaction with two different products including sales of two units of the first product (Product A) and one unit of the second product (Product B). If the POS ONE time recorded for the transaction is given by PT(i), then the relative times attributed to each of the products will be calculated in three steps. The first step is to calculate the standard time for the transaction using the following formula:[12]

$$ST(i) = 2 * \theta_A + \theta_{B,}$$

where θ_A is a standard time for Product A and θ_B is a standard time for product B. Note the "2" is included in calculation because there are two units of Product A sold during the transaction. The next step is to calculate the relative weights for each product:

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[12] This standard time could be the time from the respective single-time transaction or an average time for the product in both single-item and multiple-item transactions.

$$\rho_A = (2 * \theta_A) / ST(i)$$

$$\rho_B = (\theta_B) / ST(i)$$

The relatively weights are just the proportions of the total calculated standard time that is associated with each product included in the transaction. The final step is the attribution of the POS ONE time to the products:

$$PT(i)_A = \rho_A * PT(i)$$

$$PT(i)_B = \rho_B * PT(i)$$

The attributed costs are just the weights (proportions) multiplied by the recorded POS ONE times for the transaction. If this process were to be followed for all POS ONE transactions (each observation in a sample database) the attributed times can be added up across the small products to develop an overall distribution key.

While this approach has conceptual merit, the Postal Service has been unable to identify reliable standard times that could be used as weights in the calculation. The Postal Service is currently exploring other sources that may be useful.

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APPENDIX: Estimated Delivery Time Equation Using DOIS Data

Dependent Variable: DOIS Delivery Hours

Number of Observations Used 25132

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	63707023	7078558	31320.5	<.0001
Error	25122	5677668	226.00381		
Corrected Total	25131	69384691			

Root MSE	15.03342	R-Square	0.9182
Dependent Mean	66.49580	Adj R-Sq	0.9181
Coeff Var	22.60808		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-26.46259	0.40698	-65.02	<.0001
vol	1	0.00080344	0.00001817	44.22	<.0001
vol2	1	-1.13335E-9	2.37684E-10	-4.77	<.0001
pd	1	0.00706	0.00008130	86.86	<.0001
pd2	1	-6.47244E-8	5.212246E-9	-12.42	<.0001
volpd	1	1.203326E-9	2.025751E-9	0.59	0.5525
mlpd	1	595.87853	11.08973	53.73	<.0001
mlpd2	1	-1302.72574	31.67675	-41.13	<.0001
dt	1	24.72210	1.03918	23.79	<.0001
dt2	1	-7.35336	1.00796	-7.30	<.0001